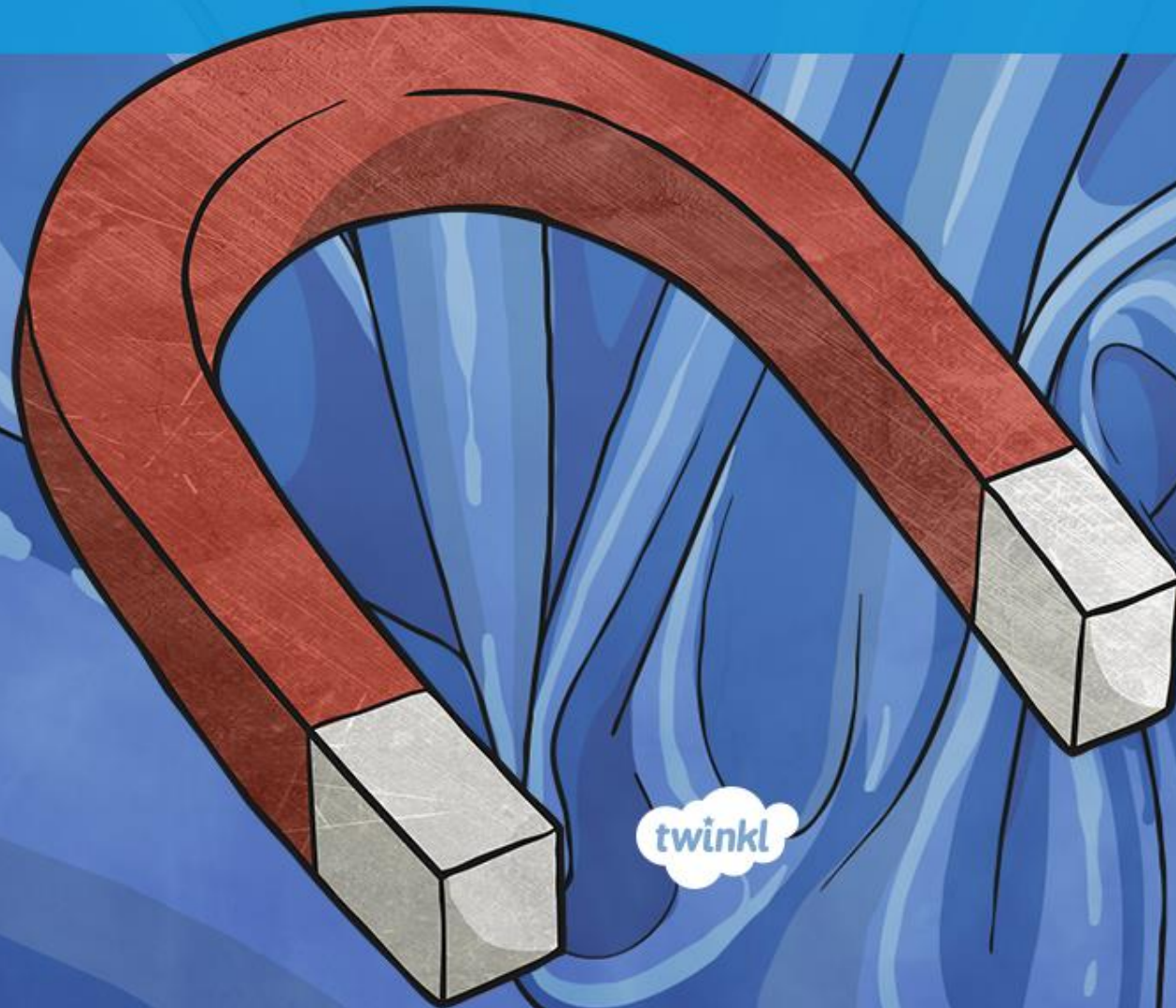


Magnets and Materials



What Is a Magnet?

A magnet is a metal which attracts (pulls together) or repels (pushes away) other materials. A magnet is made from iron, nickel, steel or cobalt. Each magnet has an invisible area of magnetism surrounding it. This is called a magnetic field.

A magnet has a north end and a south end – these are called poles, like the North and South Pole which are on opposite ends of the world.

When a magnet **attracts** another material, there is a pulling force between the two objects.

When a magnet **repels** another material, there is a pushing force between the two objects.

If you observe an object being attracted to a magnet, this is **magnetism**.

The general rule for magnets is that opposites attract.

North and South get on really well, they're great friends! When they are put near each other they pull closer together.

However, north and north do not like each other, when put close together they push apart! That goes for south and south too!

Can you think of any magnets used at home? Go on a magnet hunt!

Think about it!

Have a Go!



Forces

Push

A force to move something away.

Pull

A force to move something towards you.

Friction

A directly applied force that slows motion when objects rub together.

Magnetism

Magnets attract magnetic materials like metals and other magnets held close together can create pushing (repelling) or pulling (attracting) forces on one another.

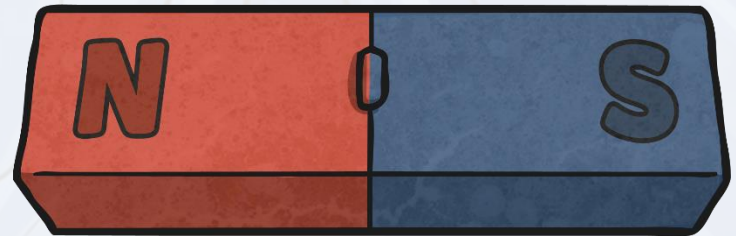
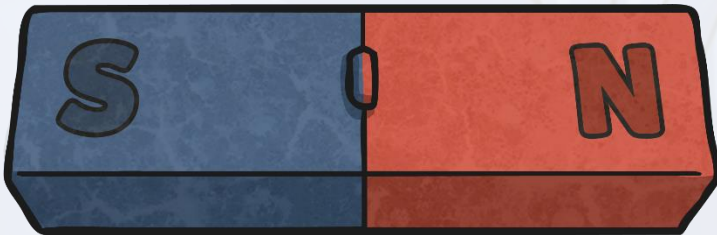
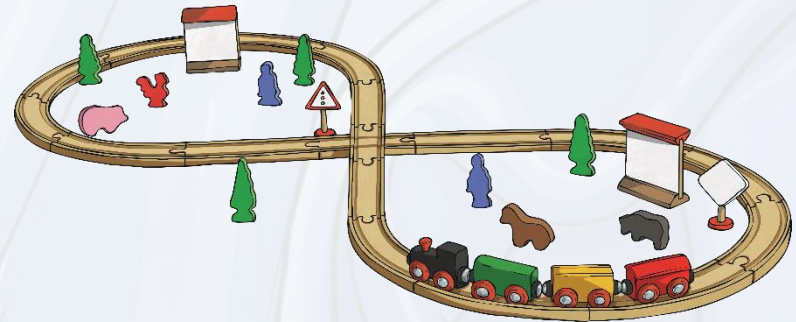
Gravity

A natural force that attracts two objects to each other. Objects have weight on Earth because gravity pulls them down.

Magnetic Forces

Unlike pushing and pulling forces, magnetic forces can work without contact being made.

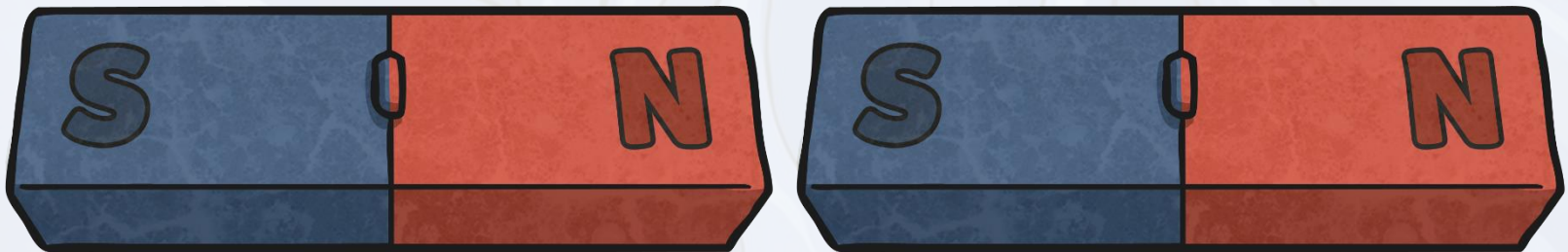
Each end of a magnet is known as a pole. There is a north pole and a south pole.



Magnetic Forces

Opposite poles attract. So the north pole of one magnet will be attracted to the south pole of another one.

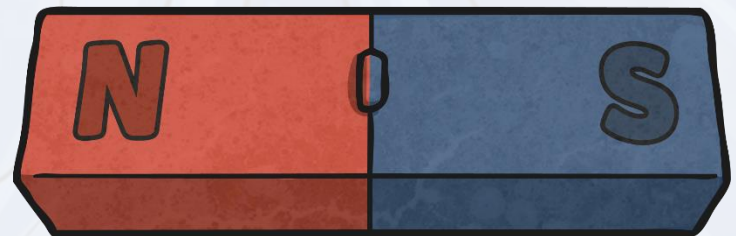
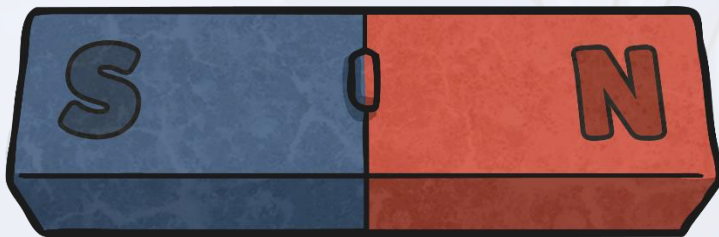
If you put two magnets close enough to each other, the force will pull them together without you actually putting them together.



Magnetic Forces

If you try to put poles of the same type together, they will push away from each other. This is called repelling.

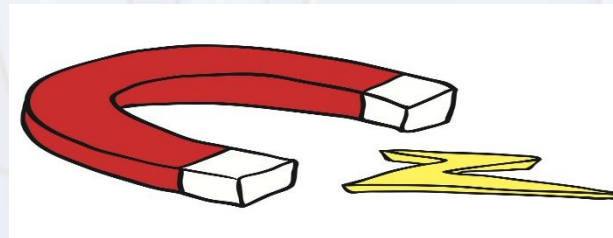
So a north pole will repel another north pole. This was why Meena couldn't get her two carriages to go together. The first carriage moved away from the second because of the repelling magnetic force even though they weren't touching.



Fact Finding Mission

Now that we've started looking in the magic behind how magnets work, it is time to go on a fact finding mission!

Can you find FIVE important facts from the previous slides and write them into your copy?

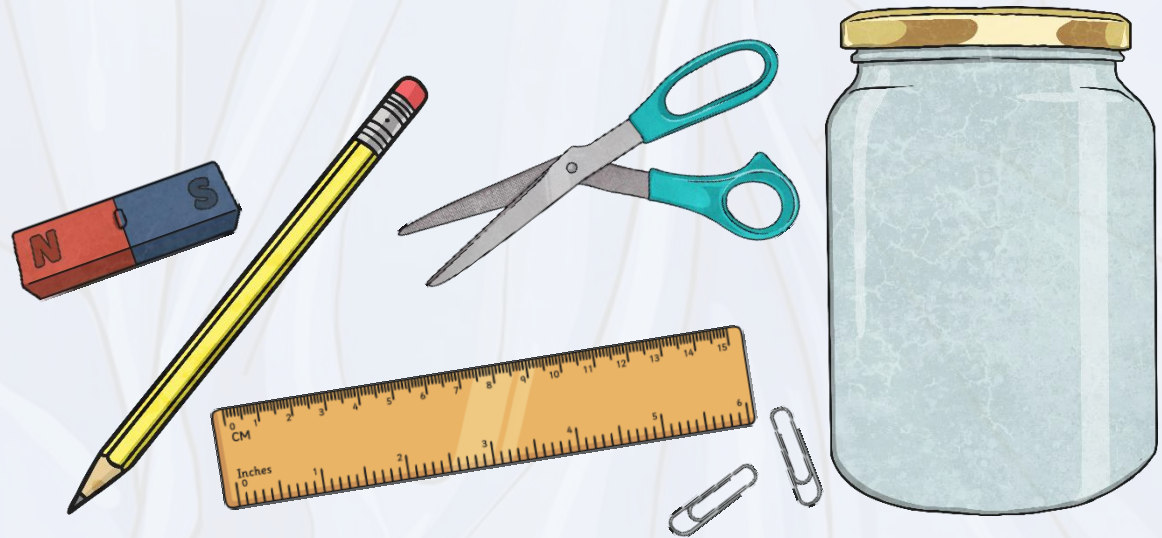


Investigating Magnetism

Some materials are magnetic and others are not. You are going to predict and then investigate which materials are magnetic and which are not.

You will need:

- A pencil
- Pennies
- A book
- Paperclips
- A drinking bottle
- A glass jar with a lid
- A wooden ruler
- Pair of scissors
- A drink can
- Safety pin
- A wooden spoon
- A scarf
- Hairgrips/slides



Your Investigation

You need to make sure your investigation is a fair test. That means you only change one part of the investigation when testing something. In this case, you will change the material you are testing.

Instructions

1. Arrange your chosen objects in front of you.
2. Write the names of the objects in your copy – use the layout of the recording sheet (→).
3. Before testing each object, think about whether it will be attracted or not attracted to the magnet, or repelled. This is called making a prediction. Write your prediction in the correct column.
4. Test your prediction and write down your observations. If you do not have a magnet at home, make a prediction and research the true result.

Object	Prediction	Test Result

Summary

Magnets are attracted to some metals. They are not attracted to **all** metals.

Iron, nickel, cobalt



Copper, mercury, gold



Aluminium, fabric, glass, plastic, wood



- Which findings surprised you?
- What conclusions can you make from your investigation?



True or False Activity

Explore the following statements and decide whether they are true or false, you can use this document and the internet to help you. Write your answers into your copy.

Magnets can attract wood and glass.

Magnets can attract or repel magnetic materials.

Metals, such as iron and nickel, are attracted to magnets.

We can see the magnetic field around a magnet.

The south-pole of one magnet will attract the south-pole of another magnet.

The north-pole of one magnet will repel the north-pole of another magnet.

A compass uses a small magnet to point south.

Planet Earth has its own magnetic field.

Magnets can be made in almost any shape or size.

Magnetic fields cannot work through other materials, such as paper.

The magnetic field around a magnet is invisible to the human eye.

Magnets can be found in many household items such as fridges and electric toothbrushes.

Materials for Your Car

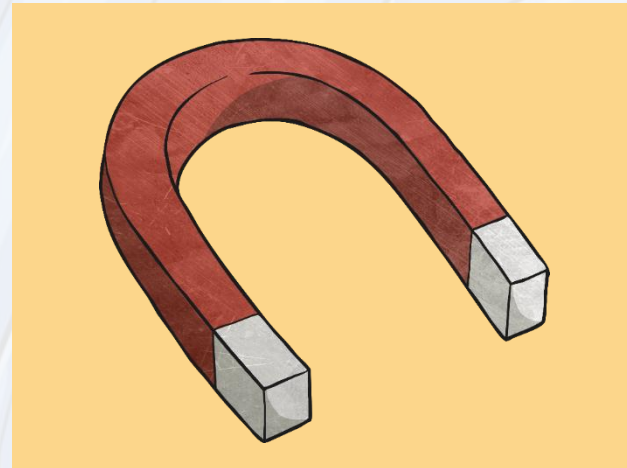
Today we can use the following materials to create our magnet powered car:

- toy car

- small magnet

- masking tape

- large magnet (bar or horseshoe) to power the car

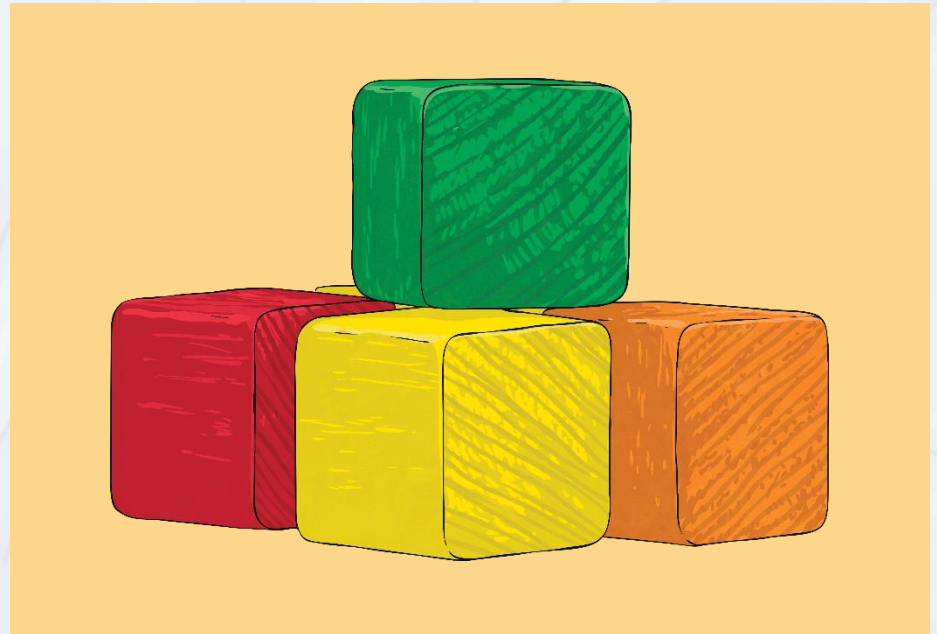


Making Your Road Track

What materials would you like to use for your road track?

Choose from this list:

- building blocks
- wooden blocks
- foam blocks
- masking tape
- paper/cardboard



Planning

We learned from our Young Engineering Ireland projects that it is really important to spend time **planning** your design.

This is an experiment so you may have to try a few different options.

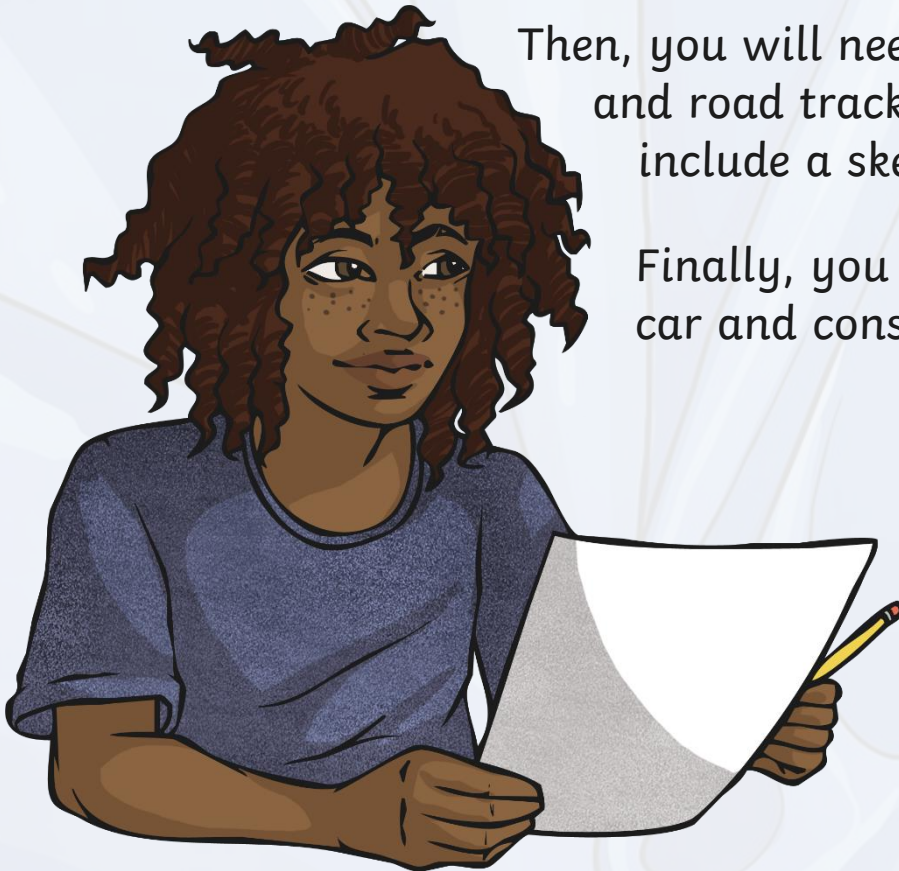


So What Is the Challenge?

First, you will test the materials to see how the car will work.

Then, you will need to design and plan your car and road track with your team. This will include a sketch of your design.

Finally, you will build your magnet powered car and construct your road track.



Important Tip!

Use the masking tape to stick the small magnet to the car.

The large magnet can be held a distance above the track to power the car and move it forward.

Creating a Magnet Powered Car

Now it is over to you!

With your team:

- 1 Examine your materials.
- 2 Sketch the design.
- 3 Build your magnet powered car and road track.
- 4 See how fast you can move your car along the track! Good luck!

